

**A NEW SPECIES OF *PHTHEIROPOIOS* EICHLER, 1940
(PHTHIRAPTERA: AMBLYCERA: GYROPIDAE) FROM
ARGENTINA, WITH A KEY TO THE MALES COLLECTED
FROM *CTENOMYS* (MAMMALIA: RODENTIA)
FROM SOUTH AMERICA¹**

Dolores del C. Castro,² Armando Cicchino,³ Marta Arce de Hamity,⁴ and Félix Ortiz¹

ABSTRACT: The species *Phtheiropoios susquensis* sp. nov. is described and illustrated from specimens of *Ctenomys* sp. collected from Laguna Múcar, Susques District, Jujuy Province, Argentina. Diagnostic features for the new species include a proportion of male forficula, male external genitalia, and counts of setae, body measurements in both sexes and external architecture of the egg. Its morphological affinities with allied species are briefly commented. A key to males of all species of the genus *Phtheiropoios* known to parasitize rodents of the genus *Ctenomys*, is included.

KEY WORDS: *Phtheiropoios*, Phthiraptera, descriptions, *Ctenomys*, Jujuy Province, Argentina, new species

To date, the genus *Phtheiropoios* Eichler includes 13 species, all parasitic on mammalian rodents of the genus *Ctenomys* Blainville (Rodentia: Octodontidae: Ctenomyinae). Other two species customarily included in this genus (e.g. Price et al., 2003) parasitize species of *Chinchilla* Bennet (Rodentia: Chinchillidae) (Cicchino and Castro 1998a, Castro and Cichino 2001). A detailed study by the authors now in progress based on adult and egg morphology of these two species led us to conclude that they fit well in the genus *Gyropus* Nitzsch, 1818 and not in *Phtheiropoios*. The only species known from Jujuy Province is *P. nematophallus* (Werneck 1935) from *C. opimus luteolus* Thomas, 1900 (Cicchino et al., 2000). It was our aim to describe a new species from *Ctenomys* sp. collected from western locality in this province near the border with Chile. Also brief comments on the morphological affinities with *P. nematophallus*, its closest morphological relative, are also provided.

METHODS

Specimens were collected from freshly trapped hosts, stained and mounted on slides following the procedure described by Cicchino and Castro (1998a). Type series and most of the specimens are housed in the collections of the Museo de La Plata, Buenos Aires Province, Argentina.

¹ Received on October 31, 2006. Accepted on April 17, 2007.

² Facultad Ciencias Naturales y Museo, 64 N° 3, 1900, La Plata, Buenos Aires, Argentina. E-Mail: castrodreon@Lpsat.com

³ Facultad Ciencias Exactas y Naturales, Deán Funes 3250, 7600 Mar del Plata, Buenos Aires, Argentina. E-mail: cicchino@copetel.com.ar

⁴ Instituto de Biología de la Altura, Av. Bolivia 1661, 4600 San Salvador de Jujuy, Argentina. E-mails: (MAH) mghamity@inbial.unju.edu.ar, (FO) fortiz@inbial.unju.edu.ar

Body measurements are in millimeters; they include maximum head length and width, maximum abdominal width and total length of the body. Terminology, including counts and notation of abdominal setae, follows that of Cicchino and Castro (1998a).

Eggs taken from freshly trapped individuals of *Ctenomys* were stored in vials with ethanol 70°.

Procedures for scanning electron microscopic study included hydration with decreasing ethanol, cleaned in physiological solution by means of an ultrasonic vibrator, rinsed in distilled water, fixed in 70% ethanol solution, dehydrated with increasing ethanol solution, mounted in stubs, coated with goldpalladium, then observed and photographed at different magnifications in a Jeol/RO 1.1 scanning electron microscope at the Electronic Microscopy Service of Museo de La Plata, Buenos Aires Province. Nomenclature of chorionic structures follows those used by Cicchino and Castro (1994, 1998b). Measurements are expressed in micrometers (μm).

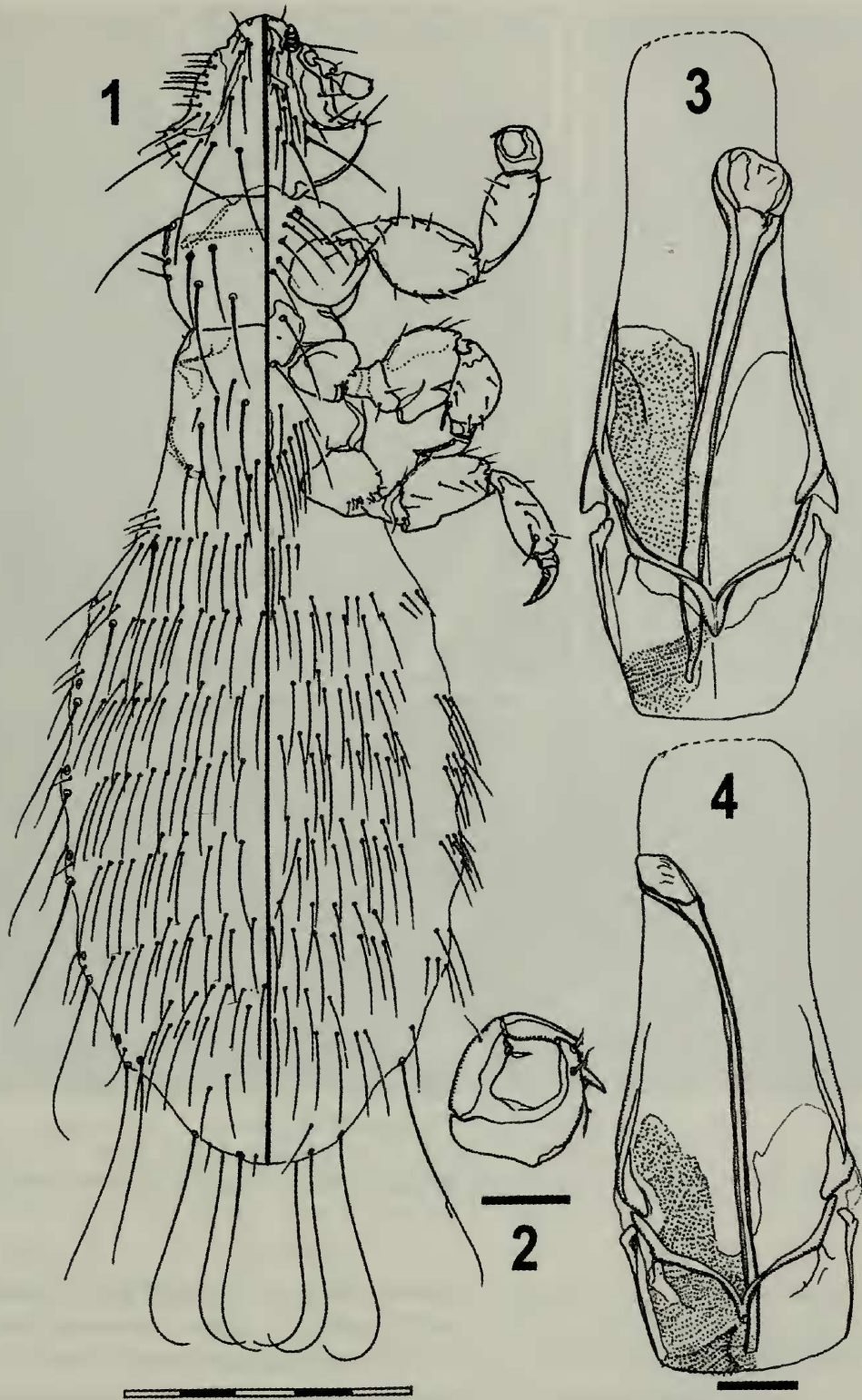
SYSTEMATIC ENTOMOLOGY

Phtheiropoios susquensis sp. nov.

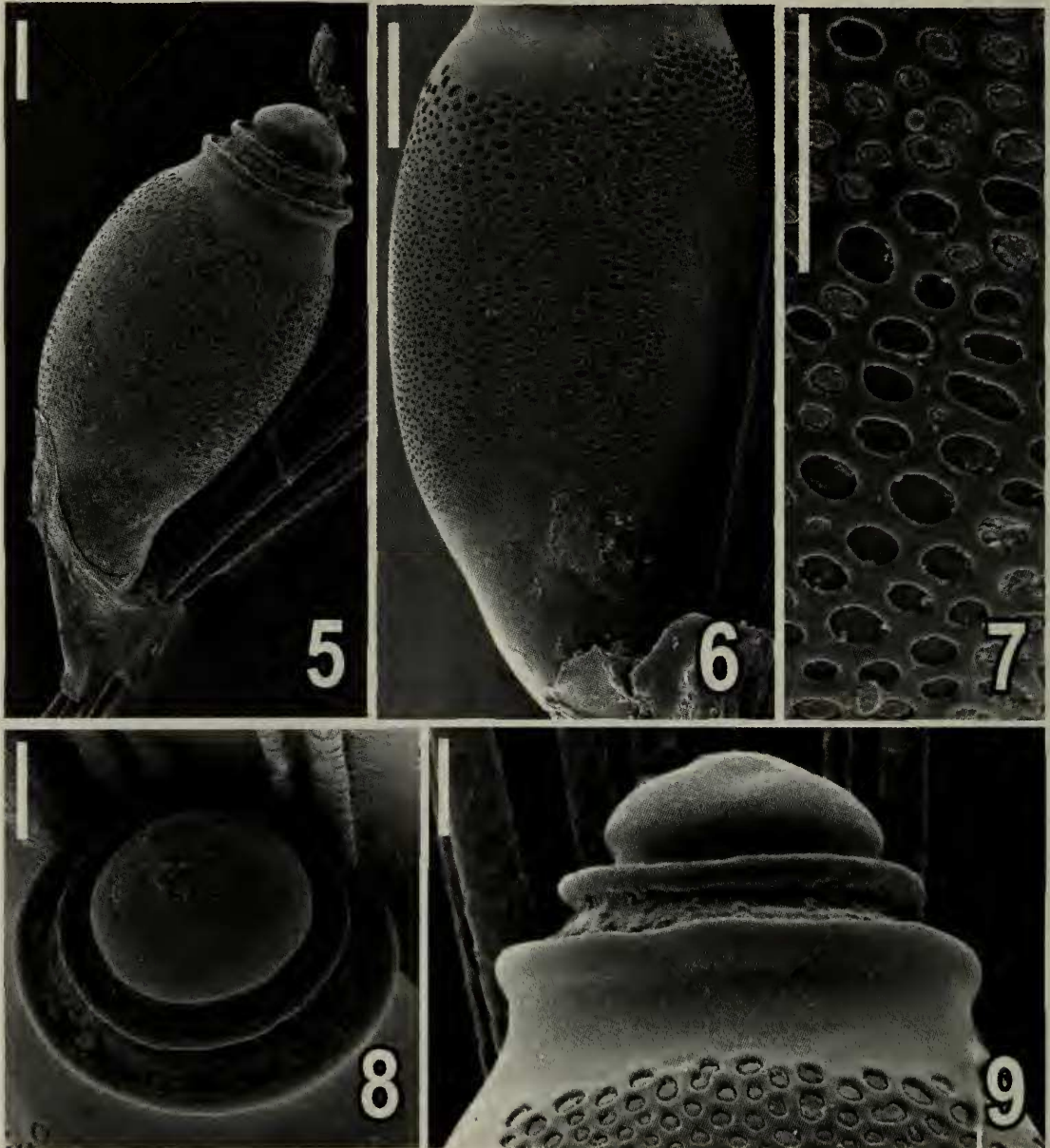
(Figs. 1-9)

Male Holotype (Fig. 1). Body shape elongated, reminiscent of *P. nematophallus*. Measurements. Head length 0.313-0.326; head width 0.333-0.347; maximum width of abdomen 0.687-0.708; total body length 1.926-2.069. Forficulae with "toe" not projected beyond level of second tarsomere (Fig. 2). Abdominal chaetotaxy. Tergal setae: I (3-6) 8-11; II (8-9) 14; III (9-13) 15-18; IV (9-10) 16-20; V (10-14) 17; VI (10-15) 15-17; VII (10-12) 10-11; VIII (6-7) 2; sternal setae: I (2) 4-6; II (13-17) 14-17; III (14-18) 15-17; IV (15-16) 16-17; V (13-15) 12-15; VI (11-15) 14-16; VII (8-13) 11-14; VIII (6-7) 2. External genitalia. Basal plate and general structure similar to *P. nematophallus*, differing in shape and thickness of the genital sclerite, shape and proportions of the basal plate, and pseudopenis (Figs. 3-4).

Female: Similar to male, except for larger size and counts of abdominal setae. Measurements. Head length 0.326; head width 0.374-0.391; maximum width of the abdomen 0.694-0.803; total body length 2.096-2.273. Chaetotaxy. Tergal setae: I (6-8) 11; II (12-16) 14-15; III (16-19) 16-19; IV (20-24) 18-19; V (20-24) 20-21; VI (21-23) 17-18; VII (16-19) 10-11; VIII 5-8; sternal setae: I (2-3) 4-6; II (19-21) 18; III (19-24) 17-18; IV (22) 17-18; V (21-22) 16-17; VI (16-20) 16; VII (12-17) 13-15. External genitalia: vulvar margin not differing significantly from that of *P. mendocinus* (see Cicchino and Castro 1998).



Figures 1-3 *Phtheiropopios susquensis* sp. nov. 1. Male, dorsal-ventral view (scale = 500 μ m); 2. Idem, left forficula (scale = 50 μ m); 3. Idem, external genitalia (scale = 50 μ m). Figure 4. *P. nematophallus* (Werneck 1935), external genitalia (same scale as Fig. 3).



Figures 5-9 *Phtheiropoios susquensis* sp. nov., egg, SEM pictures: 5. whole egg, 6. lateral aspect of the amphora, 7. detail of the mesh of the amphora, 8. operculum in semipolar view, 9. lateral view. Scales: Figs 5-6 = 100 μm ; Fig. 7 = 25 μm ; Figs. 8-9 = 50 μm .

External architecture of the egg: Silhouette largely elliptical (Fig. 5), with a prominent eccentric and deciduous phanerum (Fig. 5). Operculum: capitate (see Cicchino and Castro, 1994) strongly convex, with surface smooth (Figs. 8, 9), with 17-21 air chambers (Fig. 8). Opercular callus uniformly thickened, neither raised nor reflexed upwards (Figs. 8, 9). Callus of the amphora scarcely elevated (Figs. 8, 9). Amphora: surface ornamented with an irregular mesh composed of unequal semielliptical areolae (diameter ranging from 2.3 to 13.6 μm), becoming smaller toward the surface faced with the hair and the posterior end of the

egg (Fig. 6). Measurements: diameter of the operculum 115-123 μm , opercular height 75.7-81.2 μm , diameter of the amphora 281-360 μm , length of the amphora 544-588 μm , Length of the opercular phanerum 98-105 μm , total length of the egg 611-659 μm .

Specimens Examined: Holotype male, 5 males and 5 females Paratypes. Laguna Múcar, Susques District, Jujuy Province, Argentina, 3700 meters above sea level, 17-IX-2000, Yanina Arzamendia. Holotype and most of the paratypes at the Museum of La Plata.

Etymology: The epithet *susquensis* refers to the geographical district where the type series was collected, located at the SW Jujuy Province in Argentina.

Diagnosis: This species is close to *P. nematophallus* (Werneck, 1935), differing greatly in shape and structure of the genital sclerite of males; both sexes show a large number of setae in the abdomen, body silhouette and measurements.

Host: *Ctenomys* sp from Laguna Múcar (23°28' S; 67°8' W, 3700 meters above sea level), Susques Department, Jujuy Province, Argentina. Within the geographic area, two species and subspecies of *Ctenomys* are cited: *C. frater* Thomas, 1902 from the yunga and andean highlands of Jujuy and Salta Provinces, and *C. opimus luteolus* Thomas, 1900 from the punean highlands of the Andes of Catamarca, Salta and Jujuy provinces (Bidau, 2006). Identity of the specimens from which lice were collected is still uncertain, and it is now under study in the Universidad Nacional de Jujuy, Argentina.

Remarks: Strong morphological similarities to *P. nematophallus* (Werneck, 1935), *P. ewingi* (Werneck, 1936) and *P. susquensis* sp. nov. seem to be consistent with the currently accepted evolutionary theory of the different lineages of *Ctenomys* (Contreras and Bidau, 1999). Hosts of the three species belong to derivatives of the main stem of this genus, originated in the highlands of Bolivia and adjacent parts of Argentina (Reig et al., 1990); some of them are associated with the above cited lice species (Contreras et al., 1999).

Key to males of the genus *Phtheiropoios* known to parasitize species of the genus *Ctenomys*

1. Pseudopenis deeply V-shaped, noticeably widened, thickened, and produced backwards in middle. Apical portion of basal plate slightly widened. No traces of sclerite in genital sac *P. tucumanus* Cicchino, 1986
- 1' Pseudopenis otherwise, slightly widened, and produced backward in middle and sometimes also at sides. Apical portion of basal plate noticeably widened. Sclerite present, or at least discernable at the differentiation of the apex of the genital sac and consistently associated with the latter 2
2. Genital sclerite present as unpigmented or slightly pigmented differentiation of apex of genital sac 3
- 2' Genital sclerite always well differentiated and pigmented 10

3. Genital sclerite tube-like and partially contorted, unpigmented. Lateral edges of pseudopenis produced caudally *P. centralis* Castro and Cicchino, 2001
- 3' Genital sclerite otherwise, always slightly pigmented. Lateral edges of pseudopenis caudally produced or not 4
4. Genital sclerite not V- or U-shaped 5
- 4' Genital sclerite V-shaped or U-shaped. Pseudopenis always slightly thickened and caudally produced in middle..... 6
5. Genital sclerite pear-shaped, caudally round. Pseudopenis greatly thickened and produced medially.....*P. rionegrensis* Cicchino and Castro, 1994
- 5' Genital sclerite rounded, caudally produced and forming a double series of small sclerites. Pseudopenis slender and caudally produced in the middle *P. inaequalis* Castro and Cicchino, 2007
6. Genital sclerite V-shaped 7
- 6' Genital sclerite U-shaped 9
7. "Thumb" of forficula short, not reaching level of second tarsomere. Body silhouette slender: maximum width of abdomen 0.52-0.58 mm
.....*P. mendocinus* Cicchino and Castro, 1998
- 7' "Thumb" of forficula long, exceeding level of apex of second tarsomere. Body silhouette stout 8
8. Maximum width of abdomen 0.63-0.67
..... *P. cordobensis* Castro and Cicchino, 2002
- 8' Maximum width of abdomen 0.73-0.78 mm
..... *P. forficulatus* (Neumann, 1912)
9. Tibia almost as wide as pro-femur. Meta-femur almost as wide as meso-femur. Thumb of forficula greatly enlarged and its apical third somewhat curved inwards*P. latipollicaris* (Ewing, 1924)
- 9' Tibia 1 more slender than pro-femur. Meta-femur noticeably more slender than the meso-femur. Thumb of forficula not enlarged or curved inwards *P. gracilipes* (Ewing, 1924)
10. Genital sclerite short and stout, composed of two subtriangular and superimposed pieces. Pseudopenis very narrow*P. wetmorei* (Ewing, 1924)
- 10' Genital sclerite elongated, composed of single piece 11
11. Genital sclerite short (length 68-75 μm), bacilliform
..... *P. pollicaris* (Ewing, 1924)

- 11' Genital sclerite very long (over 200 μm), with its basal end widened12
12. Genital sclerite deflexed, spoonlikev..... *P. ewingi* (Werneck, 1936)
- 12' Genital sclerite almost straight13
13. Maximum width of the genital sclerite 6.8-8 μm
 *P. nematophallus* (Werneck, 1935)
- 13' Maximum width of the genital sclerite 14-16 μm *P. susquensis* sp. nov.

ACKNOWLEDGMENT

The authors thank Dr. Lilia E. Neder (Instituto de Biología de la Altura, Jujuy province, Argentina) for reading the manuscript.

LITERATURE CITED

- Bidau, C. J.** 2006. Superfamilia Octodontoidea Waterhouse, 1839. Familia Ctenomyidae Lesson, 1842. pp. 212-231. In, R. M. Bárquez, M. M. Díaz and R. A. Ojeda (Editors). Mamíferos de Argentina, Sistemática y distribución. Sociedad Argentina para el Estudio de los Mamíferos (SAREM), Tucumán, Argentina. 359 pp.
- Castro, D del C. and A. C. Cicchino.** 2001. A new species of the genus *Phtheiropoios* Eichler, 1939 (Phthiraptera, Gyropidae), parasitic on a *Ctenomys* (Mammalia, Octodontidae) from central Cordoba, Argentina. The Canadian Entomologist 133 (1):87 - 92.
- Castro, D del C. and A. C. Cicchino.** 2007 (in press). Two remarkable species of *Phtheiropoios* Eichler (Phthiraptera: Gyropidae) from Tucumán province, Argentina. The Canadian Entomologist 139:472 - 477.
- Cicchino, A. C. and D. del C. Castro.** 1994. On *Gyropus parvus parvus* (Ewing, 1924) and *Phtheiropoios rionegrensis* sp. nov. (Phthiraptera, Amblycera, Gyropidae), parasitic on *Ctenomys haighi* Thomas, 1919 (Mammalia, Rodentia, Ctenomyidae) Iheringia, Serie Zoología (77):3 - 14.
- Cicchino, A. C. and D. del C. Castro.** 1998. *Phtheiropoios mendocinus* sp. nov. y estado del conocimiento de las demás especies del genero *Phtheiropoios* Eichler, 1940 (Phthiraptera: Gyropidae) en la provincia de Mendoza, Argentina. Gayana Zoología 62:183 - 190.
- Cicchino, A. C. and D. del C. Castro.** 1998b. Identificación de las especies de Gyropidae (Phthiraptera, Amblycera) parásitas de Ctenomyidae (Rodentia) de la provincia de Buenos Aires, Argentina, en base a la morfología coriónica de los huevos. Revista Brasileira de Entomología 41 (2-4):199 - 202.
- Cicchino, A. C., D. del C. Castro, and J. J. Baldo.** 2000. Elenco de los Phthiraptera (Insecta) halados en distintas poblaciones locales de *Ctenomys* (Rodentia: Octodontidae) de la Argentina, Uruguay, Paraguay, Bolivia y Brasil. Papeis Avulsos do Departamento de Zoología de Sao Paulo 41(13):197 - 211.
- Contreras, J. R. and C. J. Bidau.** 1999. Líneas generales del panorama evolutivo de los roedores excavadores sudamericanos del género *Ctenomys* (Mammalia, Rodentia, Caviomorpha: Ctenomyidae). Fundación Bartolomé Hidalgo, Ciencia Siglo XXI, Buenos Aires, Argentina 1:1 - 22.

- Contreras, J. R., D. del C. Castro, and A. C. Cicchino.** 1999. Relaciones de los Phthiraptera (Insecta, Amblycera, Gyropidae) con la distribución taxonómica del género *Ctenomys* (Mammalia, Rodentia: Ctenomyidae) Fundación Bartolomé Hidalgo, Ciencia Siglo XXI, Buenos Aires, Argentina 2:1 - 32.
- Price, R. D., R. A. Hellenthal, R. L. Palma, K. P. Johnson, and D. H. Clayton.** 2003. The chewing lice: world checklist and biological overview. Illinois Natural History Survey Special Publication 24. 501 pp.
- Reig, O. A., C. Busch, C. O. Ortells, and J. Contreras.** 1990. An overview of evolution, systematics, population biology, cytogenetics, molecular biology and speciation in *Ctenomys*. In, E. Nevo, and O. Reig (Editors) Evolution of subterranean mammals at the organismal and molecular levels. Progress in Clinical and Biological Research 335:71 - 96.